THE CLAIMS

We claim:

1. A sensor for performing surface enhanced Raman spectroscopy, comprising:

a sensor body having a throughbore;

an optical energy source for generating an optical excitation signal;

a surface enhanced Raman scattering structure that is mounted to said sensor body through which said optical excitation signal is directed for irradiating an analyte, whereupon said analyte generates primary Raman emissions in response to being irradiated by said optical excitation signal, and wherein said surface enhanced Raman scattering structure generates secondary Raman emissions when irradiated by said optical excitation signal;

an optical detector for generating an output signal that represents the spectral characteristics of said primary and secondary Raman emissions in response to receiving said primary and secondary Raman emissions; and

a processor for substantially filtering said secondary Raman emission from said primary Raman

emissions and for generating an output signal representing said analyte.

2. The sensor of claim 1 which further includes a first optical fiber for directing said optical excitation signal through said SERS structure.

3. The sensor of claim 2 which further includes a bandpass filter for attenuating any self excited Raman emissions that may be stimulated by said optical excitation signal in said first optical fiber.

4. The sensor of claim 1 further including a second optical fiber for directing said primary and secondary Raman emissions to said optical detector.

5. The sensor of claim 1 further including a long pass filter for filtering optical signals having wavelengths less than a predetermined wavelength.

6. The sensor of claim 1 further including a display for presenting human readable indicia representing said analyte.

7. A sensor for performing surface enhanced Raman spectroscopy, comprising:

a sensor body;

an optical energy source for generating an optical excitation signal;

a surface enhanced Raman scattering structure that is mounted to said sensor body through which said optical excitation signal is directed for irradiating an analyte, whereupon said analyte generates primary Raman emissions in response to being irradiated by said optical excitation signal, and wherein said surface enhanced Raman scattering structure generates secondary Raman emissions when irradiated by said optical excitation signal;

an optical detector for generating an output signal that represents spectral characteristics of said primary and secondary Raman emissions in response to receiving said primary and second Raman emissions; and

a processor for creating a sample file that represents said spectral characteristics of said primary and secondary Raman emissions, a reference file that represents said secondary Raman emissions, and a data file that represents the difference between said sample file and said reference file, and for generating an output signal that represents said analyte where said analyte has spectral characteristics represented by said data file.

8. A method for identifying an analyte using Raman spectroscopy, comprising the steps of:

generating an excitation light signal;

directing said excitation light signal through a SERS structure that is in contact with an analyte so that said analyte generates primary Raman spectral emissions when irradiated by said optical excitation signal, and wherein said SERS structure generates secondary Raman spectral emissions in response to being irradiated by said excitation light signal;

generating an output signal representing said first and second Raman spectral emissions in response to detecting said first and second Raman spectral emissions;

substantially filtering said secondary Raman emission from said primary Raman emissions to create a data file;

identifying one or more candidate analytes characterized by said primary Raman emissions from said data file; and

generating an output signal that represents said candidate analytes.